

## ***Dampierella* and *Goodeniaphila*: two new genera and three new species of Halticini from Australia, with a species key to the Halticini of Australia (Hemiptera: Heteroptera: Miridae: Orthotylinae)**

NIKOLAI J. TATARNIC

*Evolution & Ecology Research Centre, School of Biological, Earth and Environmental Sciences, University of New South Wales, Sydney NSW 2052 Australia. E-mail: n.tatarnic@unsw.edu.au*

### **Abstract**

Two new genera of Halticini (Heteroptera: Miridae) from Australia, *Dampierella* and *Goodeniaphila*, are described, and include the new species *Dampierella schwartzi*, *Goodeniaphila cassis*, and *G. schuhi*. Habitus photos, scanning electron micrographs and illustrations of salient characters, including the male and female genitalia, distribution maps, and host plant data are included. Additionally, a key to the Australian Halticini is given.

**Key words:** Insecta, Hemiptera, Heteroptera, Miridae, Orthotylinae, Taxonomy, Australia

### **Introduction**

The Halticini are a tribe of plant bugs of the mirid subfamily Orthotylinae. With a few exceptions, halticines are mostly black, possess jumping hind limbs, and have an elongate head with the height of the genae generally equal to or greater than the height of the eye. Additionally, most species exhibit some degree of wing reduction in one or both sexes. All species are thought to be phytophagous.

While the tribe is distributed globally, most species are restricted to the Palearctic region, with the majority found in the Mediterranean, eastern Europe, and northern Asia. The Halticini are poorly represented in Australia. Until recently, the tribe has been represented in Australia by only two genera: *Halticus* (*H. chrysolepis* and *H. minutus*) and *Coridromius* (incorrectly identified as *C. variegatus*). The former genus is believed to have been introduced to Australia (Cassis and Gross 2002), while the *Coridromius* fauna of Australia is now known to include five species, three of which are endemic (*C. chenopoderis*, *C. pilbarensis*, and *C. monotocopsis*) (Tatarnic and Cassis 2008).

Herein I describe two new genera of Halticini from Australia, represented by three species. This research is part of the National Science Foundation's Planetary Biodiversity Inventory on plant bugs (PBI: <http://research.amnh.org/pbi>).

### **Materials and methods**

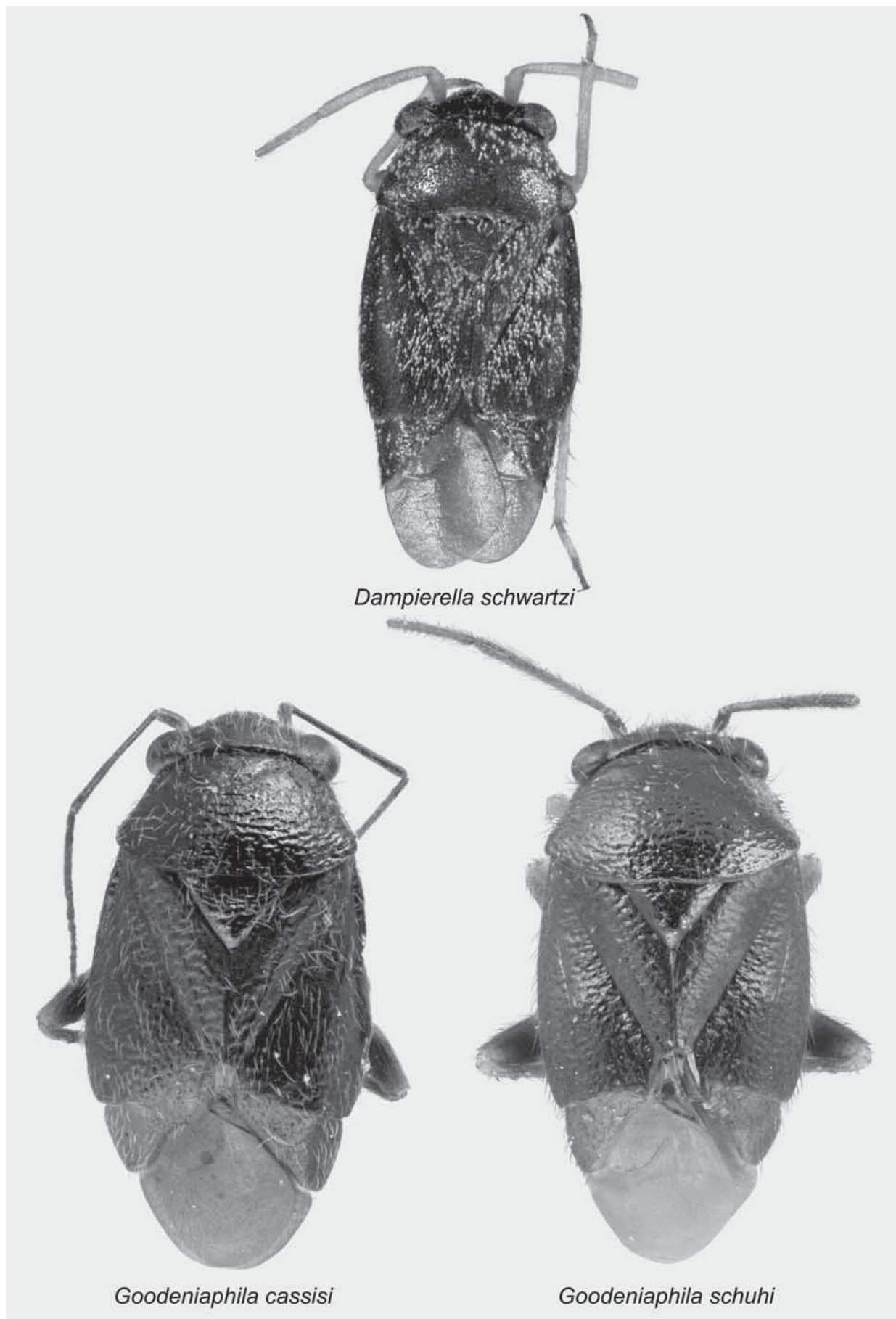
All specimens examined have been labeled with PBI "unique specimen identifiers" (USI's). All PBI USI codes begin with the project code "AMNH\_PBI", followed by an eight-digit number unique to each specimen (e.g., the type specimen of *Dampierella schwartzi* is coded as AMNH\_PBI 00030304). All collecting information, including georeference and host plant data, is presented herein. These data can also be accessed through the PBI website at <http://research.amnh.org/pbi>.

Distribution maps were generated from georeference data using the mapping program GMT, hosted on the OMC website (<http://www.aquarius.geomar.de/>). Habitus photos were taken using the Visionary Digital photo system equipped with an Infinity Photo-Optical K-2, 3-lens system and a Canon EOS 40D digital camera ([www.visionarydigital.com](http://www.visionarydigital.com)). Final images were concatenated from multiple photographs using Helicon focus ([www.heliconsoft.com](http://www.heliconsoft.com)). Male and female genitalia were both illustrated from dissections using a camera lucida mounted to a Leica DM5000B compound microscope, as well as a Leica M205 C stereomicroscope. Female genitalia and male parameres were illustrated at 100X magnification, while the male aedeagus was illustrated at 200X magnification. Measurements presented are mean values from five individuals of each sex for each species. All measurements are in millimetres.

## Taxonomy

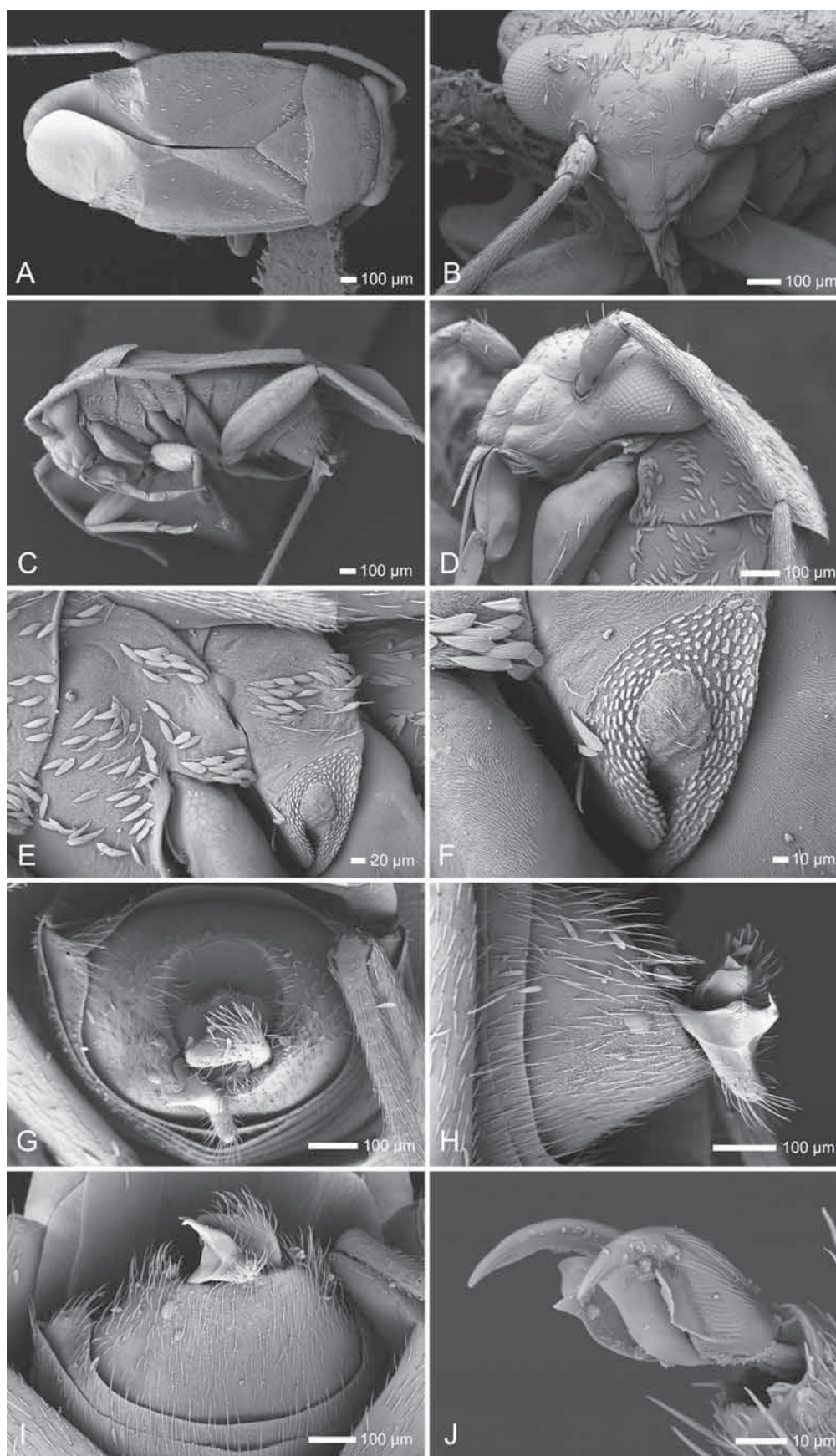
### Key to the Halticini of Australia

1. Metatibial spines in two caudally-directed rows; both sexes macropterous with hemelytra strongly deflected at base of cuneus; male aedeagus and paramere coupled to form scythe-like intromittent organ; female genitalia reduced, with sclerotized rings absent (*Coridromius*) ..... 2
  - Metatibial spines not in two caudally-directed rows; left paramere never coupled with aedeagus; female genitalia not reduced, with sclerotized rings always present ..... 6
2. Mottled cream and brown coloration, metafemora with dark blotches and transverse stripes, vittae on frons present but indistinct; proepisternum bilobed; pronotum with irregular, deep punctations ..... 3
  - Coloration variable but not mottled, metafemora with contrasting dark brown diagonal stripes, frons with strong dark vittae; proepisternum unilobed; pronotal punctures shallow and evenly spaced ..... 4
3. Costal margins of hemelytra with small brown spots; anterior lobe of proepisternum shorter than posterior lobe; right paramere without sharp triangular process ..... *C. marmoreus*
  - Costal margins of hemelytra without small brown spots; both lobes of proepisternum of equal length; right paramere with sharp triangular process ..... *C. chinensis*
4. Body size ~ 1.9 – 2.1 mm (from clypeus to cuneus); orange-brown with brown and yellow markings; posterior margin of pygophore with minute tubercle to right of deep, folded groove ..... *C. pilbarensis*
  - Body size less than 1.9 mm; coloration variable but not as above, pygophore without minute tubercle to right of folded groove ..... 5
5. Body size ~ 1.5 – 1.7 mm (clypeus to cuneus); coloration highly variable, ranging from nearly all black to pale olive, usually with darker brown markings dorsally; folded groove on posterior margin of pygophore deep ..... *C. chenopoderis*
  - Body size ~ 1.7 – 1.9 mm (clypeus to cuneus); coloration predominantly light brown with darker brown markings; folded groove on posterior margin of pygophore shallow ..... *C. monotocopsis*
6. Antennae thin, whiplike and longer than body; head taller than broad (*Halticus*) ..... 7
  - Antennae shorter than body length; head broader than tall ..... 8
7. Body dark brown to black; femora dark brown to black with yellow apices; pro- and mesotibiae yellow, metatibia embrowned ..... *Halticus minutus*
  - Mostly black, with head and propleuron yellow-orange; fore- and midlimbs yellow ..... *Halticus chrysolepis*
8. Body black; clothed in hairlike setae and white scalelike setae ..... *Dampierella schwartzi*
  - Body mostly black with olive to purple hemelytra; clothed in golden hairlike setae, scalelike setae absent (*Goodeniaphila*) ..... 9
9. Antennae uniformly dark brown to black; legs dark brown to black, paler orange-brown at joints ..... *Goodeniaphila cassisi*
  - Antennae mostly brown, with AII yellow to yellow brown with brown apex; legs yellow, often with subapical brown markings on femora ..... *Goodeniaphila schuhi*



**FIGURE 1.** Habitus images. A) *Dampierella schwartzi*; B) *Goodeniaphila cassisi*; C) *Goodeniaphila schuhi*.





**FIGURE 2.** Scanning electron micrographs of male *Dampierella schwartzi*. A) Dorsum. B) Head, anterior view. C) Lateral view. D) Head and prothorax, lateral view. E) Meso- and metathorax, lateral view. F) Detail of metathoracic scent gland apparatus. G) Pygophore, posterior view. H) Pygophore, lateral view. I) Pygophore, ventral view. J) Tarsus.

## Taxon descriptions

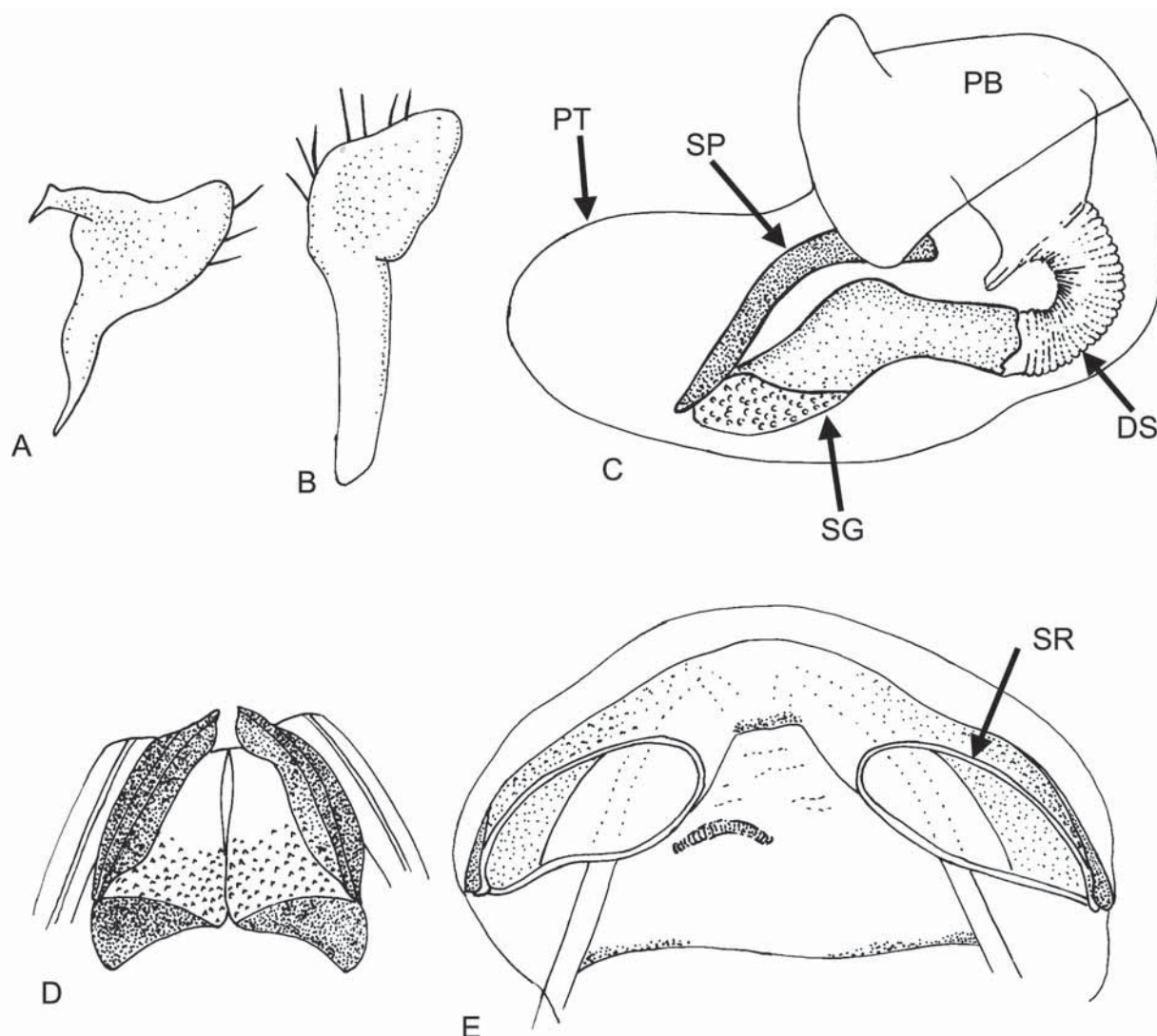
### *Dampierella* gen. nov.

Figures 1–4

**Type Species:** *Dampierella schwartzi* sp. nov., by original designation

**Holotype:** AUSTRALIA: Western Australia: 27.6 km N of Coral Bay Rd on Cardabia–Ningaloo Rd, 22.90198°S 113.8167°E, 25 m, 29 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. PERTH staff PERTH6989314, 1♂ (AMNH\_PBI 00030304) (WAMP).

**Diagnosis:** Similar to *Halticus* but readily distinguished by the following combination of characters: gena height less than eye height; male with well-developed endosoma and single spinelike spicule; both sexes macropterous.



**FIGURE 3.** *Dampierella schwartzi* genitalia. Male, A–C): A) Left paramere; B) right paramere; C) aedeagus. Female, D–E): D) posterior wall, dorsal view; E) bursa copulatrix, dorsal view; DS = ductus seminis; PB = phallobase; PT = phallosome; SG = secondary gonopore; SP = spicule; SR = sclerotized ring

**Description:** Macropterous, body length 2.27–2.6 mm (Table 1). **Coloration** (Fig. 1): Dark brown and black with yellow or yellow-brown markings. **Surface and Vestiture** (Figs. 1, 2): Head mostly smooth and impunctate; pronotum punctate; thorax, hemelytra and abdomen impunctate; head with a few hairlike setae, antennae with closely adpressed hairlike setae, segment I with a few thin spinelike setae, body clothed in white, adpressed scalelike setae and adpressed to semi-erect yellow-brown hairlike setae, legs with decumbent hairlike setae, metafemora with a few spinelike setae, metatibia spinose; both parameres with spinelike setae.

**Structure** (Figs. 1–3): Body elongate and slightly ovate. **Head** (Figs. 1, 2A–D): Transverse, short, wider than tall; eyes large and substylate, touching pronotum; height of gena subequal to height of eye; posterior margin of vertex raised as a thin carina, head wraps around pronotum; clypeus not projecting forward beyond frons; buccula small, narrow. **Antennae** (Figs. 1, 2A–D): Insertion in line with lower margin of eye; shorter than body length, segment I shorter than height of eye, somewhat swollen, segment III longer than IV. **Labium** (Fig. 2C–D): Extending just beyond metacoxae, segment I slightly longer than gena height. **Thorax** (Figs. 1, 2A, C–F): Pronotum trapezoidal, shallowly inclined, collar thin, obscured by head, callosite region obsolete, humeral angles rounded, post-humeral angles depressed, posterior margin medially concave and deflected; mesoscutum obscured by pronotum, rarely visible as a thin strip; metathoracic spiracle a narrow slit, without evaporative bodies; metathoracic scent gland external efferent system small, peritreme broad and rounded, located directly above ostiole. **Hemelytra** (Figs. 1, 2A, C): Costal margin gently convex, weakly laterally declivent; cuneus broad; membrane with single cell, extends beyond abdomen, not deflected downwards at cuneal fracture. **Legs** (Figs. 1, 2C): All femora moderately swollen; metatibia elongate; pretarsi with lamellate, apically convergent parempodia and fleshy pulvilli. **Abdomen** (Fig. 2C): Elongate-ovoid. **Male genitalia** (Figs. 2G–I, 3A–C): Pygophore short, without modifications or processes; both parameres projecting from pygophore, right paramere longer than left; left paramere with large, broad, projecting sensory lobe, arm apically bifid; right paramere basally thicker than left, with apical club deflected laterally; phallosome with apex laterally compressed, dorsally keeled; ductus seminis short with flexible ribbing, section prior to secondary gonopore lacking ribbing; secondary gonopore scoop-shaped, opening ventrally, with faint scalelike texturing; endosoma with single, curved, spinelike spicule. **Female genitalia** (Figs. 3D–F): sclerotized rings thin, weakly sclerotized, subcontiguous, elongate-elliptical, with lateral margins and adjacent portion of dorsal labiate plate moderately upturned; margin of ventral labiate plate adjoining rami forming a very weakly sclerotized band; posterior wall medially divided, laterally with paired, apically converging sclerotized bands, medially weakly sclerotized and swollen, bearing fields of spines, posterior of each lateral plate a moderately sclerotized, declivent, concave triangulate plate; vestibulum with bilaterally symmetrical sclerotization.

**Distribution:** *Dampierella* is a monotypic genus; all specimens were collected from two localities in northwest Western Australia (Fig. 4).

**Etymology:** This genus is named for its host affiliation with the plant genus *Dampiera*.

### *Dampierella schwartzi* sp. nov.

Figures 1, 3–5

**Holotype:** AUSTRALIA: Western Australia: 27.6 km N of Coral Bay Rd on Cardabia–Ningaloo Rd, 22.90198°S 113.8167°E, 25 m, 29 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. PERTH staff PERTH6989314, 1♂ (AMNH\_PBI 00030304) (WAMP).

**Diagnosis:** Superficially similar to *Halticus* but readily distinguished by the following combination of characters: gena height less than eye height; male with well-developed endosoma and single spinelike spicule; both sexes macropterous. Distinguished from *Goodeniaphila* by all-black dorsal coloration, presence of pale, scalelike setae, slightly smaller size, and male and female genitalia.

**Description:** Macropterous, body length 2.36–2.6 mm (Table 1). **Coloration** (Fig. 1): Head, thorax, hemelytra, and abdomen dark brown to black. Labium orange-brown, darker apically. Eyes dark red to dark brown or black. Antennae yellow, with apex of AIV weakly embrowned. All femora dark brown to black, yellow at apex; all tibiae yellow; tarsi yellow-brown, becoming dark brown to black apically. Parameres dark brown to black, apophysis of left paramere amber. **Surface and Vestiture** (Figs. 1; 2): As in generic description. **Structure:** As in generic description. **Male genitalia** (Figs. 2G–I, 3A–C): As in generic description. **Female genitalia** (Figs. 3D–F): As in generic description.



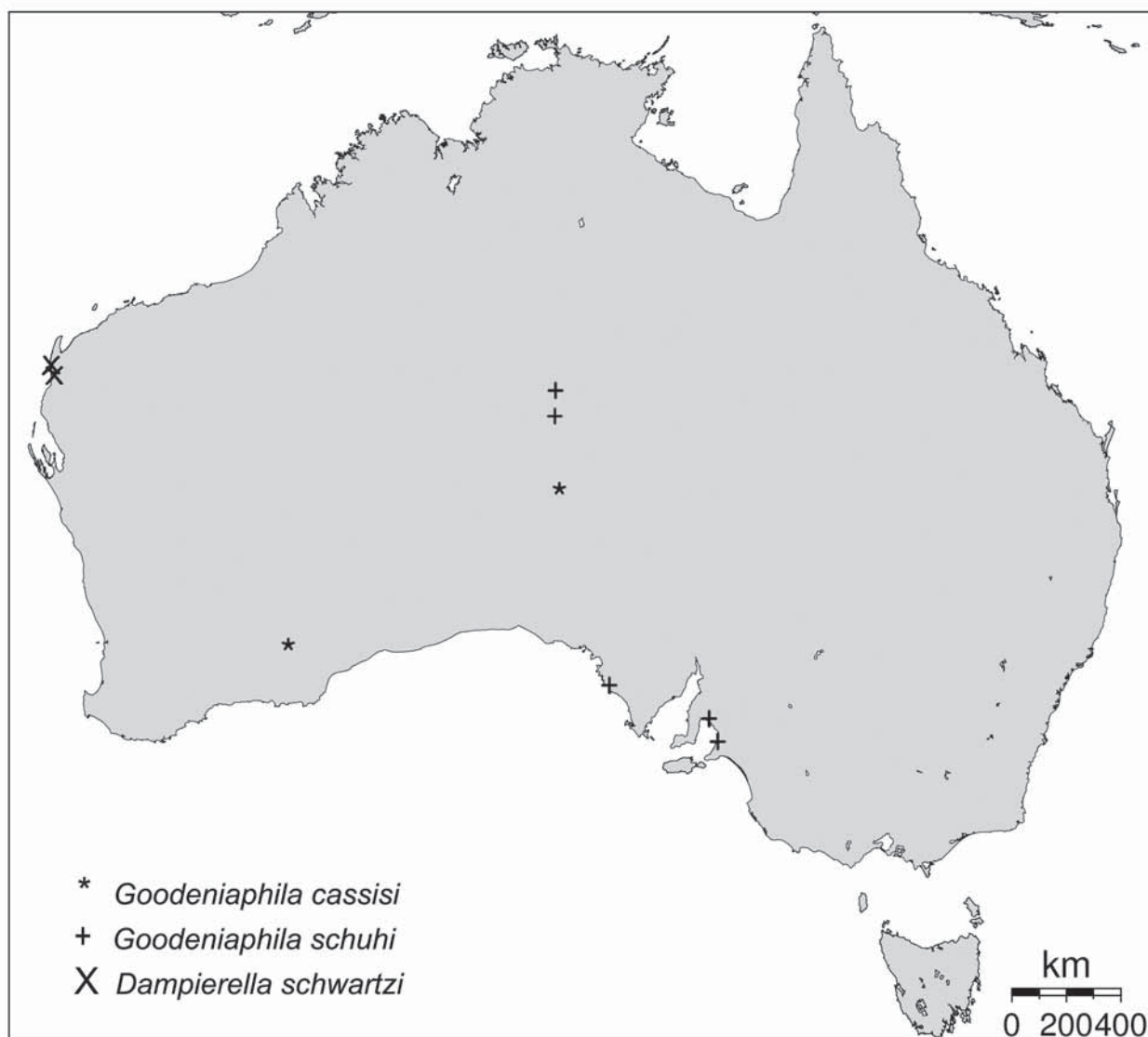
**TABLE 1.** Measurements of *Dampierella* and *Goodeniaceaphila* species.

Species		Length					Width					AI	AII	AIII	AIV	
		Total Length	Clyp-Cun	Head	Pronotum	Scutellum	Cuneus	Head	Pronotum	Scutellum	InterOcDist					
<i>Dampierella schwartzi</i>																
<b>M</b>	<b>Mean</b>	<b>2.30</b>	<b>1.53</b>	<b>0.09</b>	<b>0.45</b>	<b>0.31</b>	<b>0.34</b>	<b>0.80</b>	<b>0.99</b>	<b>0.41</b>	<b>0.48</b>	<b>0.19</b>	<b>0.57</b>	<b>0.36</b>	<b>0.26</b>	
	SD	0.03	0.04	0.02	0.01	0.02	0.02	0.03	0.05	0.04	0.01	0.02	0.02	0.02	0.02	
	Range	0.09	0.09	0.05	0.03	0.03	0.06	0.07	0.14	0.08	0.02	0.07	0.05	0.04	0.04	
	Min	2.27	1.49	0.07	0.43	0.29	0.31	0.76	0.93	0.38	0.47	0.16	0.54	0.34	0.24	
	Max	2.36	1.58	0.12	0.46	0.33	0.36	0.84	1.07	0.46	0.49	0.23	0.60	0.38	0.28	
	Count	5	5	5	5	5	5	5	5	5	5	5	5	5	4	
	<b>F</b>	<b>Mean</b>	<b>2.47</b>	<b>1.67</b>	<b>0.12</b>	<b>0.48</b>	<b>0.30</b>	<b>0.36</b>	<b>0.84</b>	<b>1.05</b>	<b>0.43</b>	<b>0.50</b>	<b>0.16</b>	<b>0.58</b>	<b>0.38</b>	<b>0.25</b>
SD	0.08	0.06	0.03	0.02	0.04	0.03	0.03	0.02	0.03	0.04	0.01	0.01	0.01	0.02	0.03	
Range	0.21	0.15	0.08	0.04	0.08	0.06	0.06	0.05	0.09	0.08	0.03	0.03	0.04	0.05	0.07	
Min	2.38	1.58	0.07	0.46	0.26	0.33	0.33	0.82	1.00	0.39	0.48	0.15	0.56	0.36	0.22	
Max	2.60	1.73	0.15	0.50	0.34	0.39	0.39	0.87	1.09	0.48	0.51	0.17	0.60	0.41	0.29	
Count	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	
<i>Goodeniaceaphila cassisi</i>																
<b>M</b>	<b>Mean</b>	<b>2.96</b>	<b>1.86</b>	<b>0.14</b>	<b>0.62</b>	<b>0.34</b>	<b>0.44</b>	<b>0.94</b>	<b>1.20</b>	<b>0.56</b>	<b>0.54</b>	<b>0.22</b>	<b>0.71</b>	<b>0.51</b>	<b>0.29</b>	
	SD	0.19	0.06	0.02	0.04	0.02	0.02	0.04	0.09	0.05	0.03	0.03	0.05	0.04	0.05	
	Range	0.49	0.13	0.05	0.09	0.05	0.04	0.11	0.21	0.11	0.07	0.07	0.13	0.10	0.12	
	Min	2.79	1.81	0.11	0.59	0.31	0.42	0.88	1.10	0.49	0.49	0.16	0.66	0.45	0.20	
	Max	3.27	1.93	0.16	0.67	0.36	0.46	0.99	1.32	0.60	0.56	0.24	0.79	0.55	0.32	
	Count	5	5	5	5	5	5	5	5	5	5	5	5	5	4	
	<b>F</b>	<b>Mean</b>	<b>3.04</b>	<b>2.02</b>	<b>0.15</b>	<b>0.66</b>	<b>0.37</b>	<b>0.48</b>	<b>1.03</b>	<b>1.30</b>	<b>0.58</b>	<b>0.61</b>	<b>0.20</b>	<b>0.73</b>	<b>0.51</b>	<b>0.33</b>
SD	0.09	0.07	0.03	0.03	0.02	0.02	0.02	0.04	0.06	0.05	0.03	0.01	0.04	0.05	0.06	
Range	0.23	0.18	0.07	0.07	0.05	0.06	0.06	0.09	0.16	0.13	0.10	0.04	0.09	0.11	0.11	
Min	2.97	1.91	0.12	0.63	0.34	0.45	0.45	0.98	1.21	0.53	0.57	0.17	0.68	0.45	0.28	
Max	3.20	2.09	0.19	0.70	0.39	0.51	0.51	1.07	1.37	0.66	0.66	0.21	0.78	0.56	0.39	
Count	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	

TABLE 1. (continued)

Species	Length					Width									
	Total Length	Clyp-Cun	Head	Pronotum	Scutellum	Cuneus	Head	Pronotum	Scutellum	InterOcDist	AI	AII	AIII	AIV	
<i>Goodeniaceaphila schuhi</i>															
M	Mean	2.56	1.71	0.11	0.63	0.27	0.36	0.89	1.14	0.47	0.56	0.17	0.68	0.49	0.58
	SD	0.14	0.09	0.03	0.05	0.02	0.04	0.02	0.05	0.03	0.01	0.03	0.03	0.04	0.67
	Range	0.35	0.24	0.07	0.14	0.06	0.10	0.04	0.12	0.07	0.03	0.07	0.07	0.10	1.53
	Min	2.44	1.57	0.06	0.54	0.25	0.30	0.87	1.06	0.44	0.55	0.15	0.64	0.44	0.25
	Max	2.78	1.81	0.13	0.68	0.31	0.40	0.91	1.19	0.51	0.58	0.22	0.71	0.54	1.78
	Count	5	5	5	5	5	5	5	5	5	5	5	5	5	5
F	Mean	2.78	1.84	0.14	0.68	0.28	0.42	0.96	1.20	0.44	0.58	0.16	0.73	0.52	0.31
	SD	0.24	0.16	0.03	0.05	0.02	0.05	0.08	0.05	0.02	0.02	0.01	0.04	0.04	0.03
	Range	0.56	0.37	0.07	0.11	0.06	0.12	0.21	0.11	0.05	0.04	0.03	0.09	0.10	0.07
	Min	2.51	1.68	0.10	0.63	0.25	0.37	0.89	1.14	0.41	0.56	0.15	0.69	0.46	0.29
	Max	3.07	2.05	0.18	0.74	0.31	0.49	1.10	1.25	0.46	0.60	0.18	0.78	0.56	0.36
	Count	5	5	5	5	5	5	5	5	5	5	5	5	4	4





**FIGURE 4.** Distribution map for *Dampierella schwartzi*, *Goodeniaphila cassisi* and *Goodeniaphila schuhi*.

**Distribution:** All specimens of this species have been collected from two localities in central West Australia (Fig. 4).

**Host plant associations:** This species was collected in large numbers on *Dampiera incana* var. *incana* (Goodeniaceae).

**Etymology:** This species is named in honor of Dr Michael Schwartz, in recognition of his contributions to mirid taxonomy.

**Paratypes: AUSTRALIA: Western Australia:** 22.5 km N of jct of Mugaloo Rd and Cardaboo-Ningaloo Rd, Ningaloo Station Campsite, 22.54062°S 113.6947°E, 30 Oct 2004, Cassis, Wall, Weirauch, Tatarinic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. Field ID, 2♂ (AMNH\_PBI 00003896, AMNH\_PBI 00003897), 8♀ (AMNH\_PBI 00003898 through AMNH\_PBI 00003905) (AMNH), 7♂ (AMNH\_PBI 00003908 through AMNH\_PBI 00003914), 5♀ (AMNH\_PBI 00003915 through AMNH\_PBI 00003919) (UNSW). 27.6 km N of Coral Bay Rd on Cardabia-Ningaloo Rd, 22.90198°S 113.8167°E, 25 m, 29 Oct 2004, Cassis, Wall, Weirauch, Tatarinic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. PERTH staff PERTH6989314, 2♂ (AMNH\_PBI 00016199, AMNH\_PBI 00016200), 2♀ (AMNH\_PBI 00016201, AMNH\_PBI 00016202) (AM), 11♂ (AMNH\_PBI 00003856 through AMNH\_PBI 00003866), 23♀ (AMNH\_PBI 00003867 through AMNH\_PBI 00003889) (AMNH), 2♂ (AMNH\_PBI 00191299,

AMNH\_PBI 00191300), 3♀ (AMNH\_PBI 00191301 through AMNH\_PBI 00191303) (USNM), 5♂ (AMNH\_PBI 00030305 through AMNH\_PBI 00030309), 5♀ (AMNH\_PBI 00030310 through AMNH\_PBI 00030314) (WAMP).

**Other specimens examined: AUSTRALIA: Western Australia:** 22.5 km N of jct of Mugaloo Rd and Cardaboo-Ningaloo Rd, Ningaloo Station Campsite, 22.54062°S 113.6947°E, 30 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. Field ID, 2 juveniles (AMNH\_PBI 00003906, AMNH\_PBI 00003907) (AMNH). 27.6 km N of Coral Bay Rd on Cardabia-Ningaloo Rd, 22.90198°S 113.8167°E, 25 m, 29 Oct 2004, Cassis, Wall, Weirauch, Tatarnic, Symonds, *Dampiera incana* var. *incana* R.Br. (Goodeniaceae), det. PERTH staff PERTH6989314, 6 juveniles (AMNH\_PBI 00003890 through AMNH\_PBI 00003895) (AMNH), 2 juveniles (AMNH\_PBI 00003920) (UNSW), 5 juveniles (AMNH\_PBI 00030315 through AMNH\_PBI 00030319) (WAMP).

### *Goodeniaphila* gen. n.

Figures 1, 4–8

**Type species:** *Goodeniaphila cassisi* sp. n., by original designation

**Diagnosis:** *Goodeniaphila* is most similar in appearance to *Strongylocoris*, but is distinguished by the presence of a well-developed metathoracic scent gland external efferent system, slightly olive coloration of the hemelytra, and the male and female genitalia.

**Description:** Both sexes macropterous, elongate-oval, body length 2.44–3.27 (Table 1). **COLORATION** (Figs. 1, 5): Head, pronotum, and scutellum glossy black, hemelytra faintly dark olive; antennae yellow-brown to black; legs yellow to black. **SURFACE AND VESTITURE** (Figs. 1; 6): Surface mostly glossy and shining except for dull hemelytra; head smooth, pronotum, scutellum and hemelytra rugulopunctate; body clothed in golden, hairlike setae; hemelytra densely covered with minute golden setae; antennae without spines, tibiae spinose. **STRUCTURE:** Body elongate-oval. **Head** (Figs. 1, 5, 6A–D): Transverse, short, broader than tall; eyes sessile, height of gena slightly less than eye height; vertex convex, with transverse sulcus along posterior margin, posterior margin upturned and carinate, wrapping around pronotum; clypeus angled slightly posteriorly; bucculae small, narrow. **Antennae** (Figs. 1, 5, 6B–D): Insertion in line with lower margin of eye; shorter than body length, segment I shorter than eye height, only slightly thicker than segment II; segment IV shorter than III. **Labium:** Extending to metacoxae, segment I somewhat swollen, subequal in length to gena height; **Thorax** (Figs. 1, 5, 6C–F): Pronotum trapezoidal, broad, collar absent, callosite region weakly defined, posterior margin straight, thin, and carinate, extending over mesoscutum; metathoracic spiracle a narrow slit surrounded by evaporative bodies; metathoracic scent gland external efferent system prominent and swollen, peritreme oval, oriented vertically above ostiole, surrounded by evaporative bodies. **Hemelytra** (Figs. 1, 5, 6A, C): Lateral margins weakly convex; clavus laterally declivent; medial fracture obsolete; cuneus broad; membrane and cuneus declivent at cuneal fracture; membrane with single enclosed cell, extending beyond abdomen. **Legs** (Figs. 1; 5, 6C, J): Metafemora moderately incrassate; pretarsi with lamellate, apically convergent parempodia and fleshy pulvilli. **Abdomen** (Figs. 5, 6C): Elongate-ovoid. **Male genitalia** (Figs. 6G–I, 7A–D, 8A–C): Pygophore opening broad, posterior margin with shallow concavity below left paramere; left paramere broad with short base, sensory lobe prominent, apophysis thin and apically hooked; right paramere longer than left, with sensory lobe, hockey-stick shaped, projects beyond genital opening of pygophore; phallosome short, heavily contoured and sclerotized, ductus seminis wide, with sclerotized ribbing; secondary gonopore scoop-shaped with faint scalelike texturing; endosoma with assortment of elongate, serrate and platelike spicules, endosoma apically affixed to phallosome. **Female genitalia** (Figs. 7E–G, 8D–F): Sclerotized rings thin, weakly sclerotized, widely separated or subcontiguous, elongate-elliptical, with lateral margins and adjacent portion of dorsal labiate plate strongly upturned; margin of ventral labiate plate adjoining rami forming a sclerotized rim, lateralmost region of ventral labiate plate joined with rami and sclerotized rings to form paired, medially projecting, sclerotized processes which

continue medially to form a sclerotized interramal band; posterior wall bilaterally divided, partly sclerotized, posteriorly with fields of spines; margins of vesibulum mostly bilaterally symmetrical, left side with sclerotized process.

**Distribution:** This genus is known from two species collected in Western Australia, South Australia and the Northern Territory (Fig. 4).

**Included Species:**

*Goodeniaphila cassis*

*Goodeniaphila schuhi*

**Host Plant Associations:** Both species have been collected exclusively on species belonging to the plant family Goodeniaceae.

**Etymology:** The name *Goodeniaphila* reflects the affinity of this genus to plants of the family Goodeniaceae.

***Goodeniaphila cassis* sp. n.**

Figures 1, 4–7

**Holotype: AUSTRALIA: Western Australia:** 81 km E of Norseman, 32.07347°S 122.6166°E, 600 m, 23 Oct 1996, Schuh and Cassis, *Coopernookia strophiolata* (F.Muell.) Carolin (Goodeniaceae), det. PERTH staff PERTH 05054923, 1♂ (AMNH\_PBI 00030284) (WAMP).

**Diagnosis:** Distinguished from *G. schuhi* by the predominantly black legs and distinct male and female genitalia. Additionally, males and females of *G. cassis* tend to be the same size, whereas in *G. schuhi* females are generally noticeably larger.

**Description:** COLORATION (Figs. 1, 5): Antennae uniformly dark brown to black; legs dark brown to black, paler orange-brown at joints; remainder of body coloration as in generic description. SURFACE AND VESTITURE (Figs. 1, 6): As in generic description.

STRUCTURE: As in generic description. Male genitalia (Figs. 6G–I, 7A–D): Pygophore, parameres, ductus seminis, and secondary gonopore as in generic description; phallosome short, apically subquadrate, heavily contoured and sclerotized; endosoma with long, apically serrate and branching spatula-shaped spicule dorsally, apically with various short, branch-like spicules and large, rounded funnel-like spicule; endosoma apically affixed to phallosome. Female genitalia (Figs. 7E–G): Sclerotized rings subcontiguous, elongate-elliptical; posterior wall with paired, bulging, sclerotized processes, posteriorly with fields of spines; remainder as per generic description.

**Distribution:** This species is known from two collecting events in Western Australia and one in inland South Australia (Fig. 4).

**Host Plant Associations:** This species has been collected in large numbers from *Coopernookia strophiolata*.

**Etymology:** *G. cassis* is named in honor of my mentor and Ph.D. supervisor, Gerry Cassis, for his significant contributions to heteropteran biology.

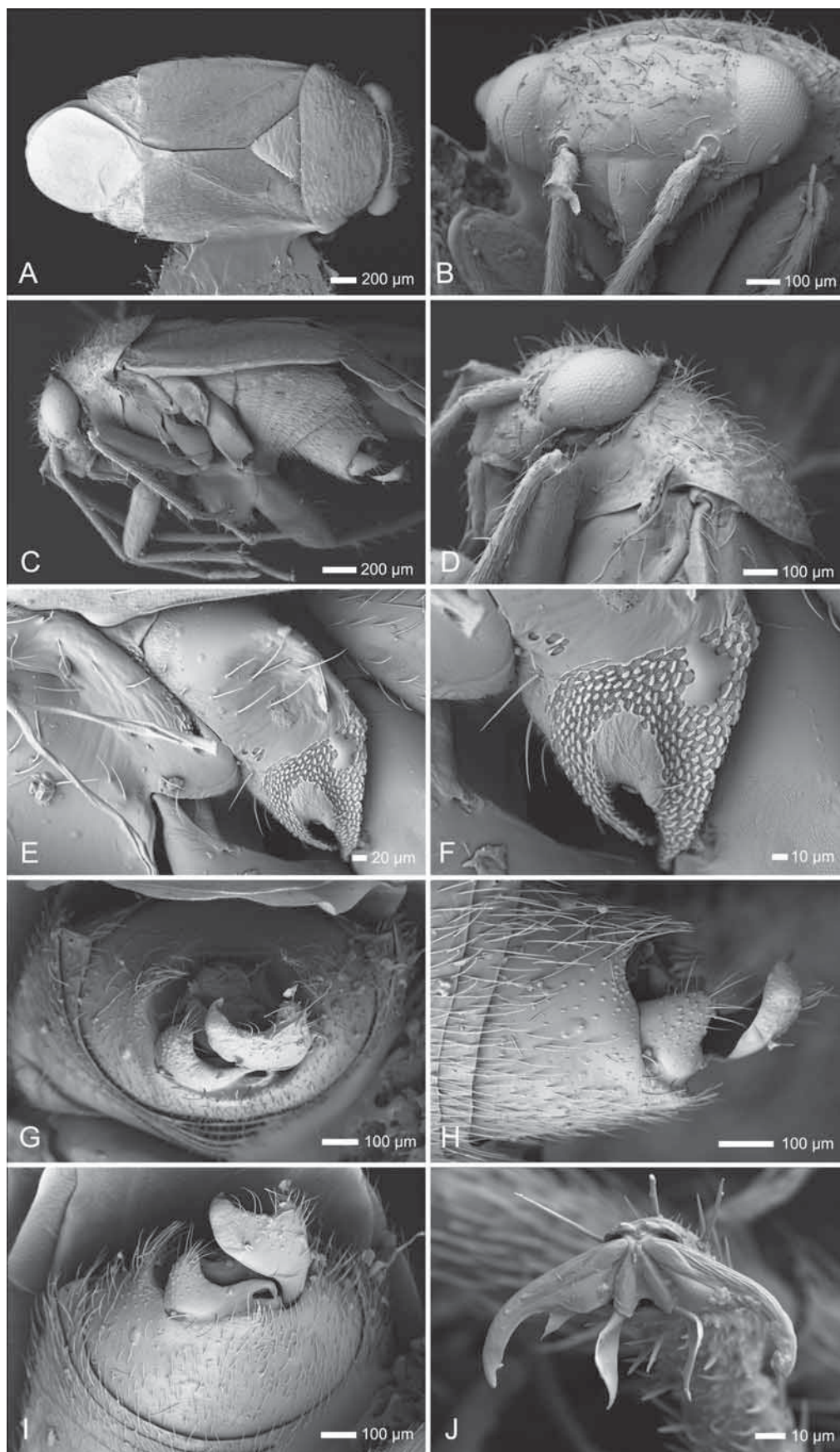
**Paratypes: AUSTRALIA: South Australia:** Camp and Victory Well area, Everard Park Station, 27°S 132.7°E, 05 Nov 1970 - 05 Nov 1970, G. F. Gross, 2♂ (AMNH\_PBI 00038828, AMNH\_PBI 00038829), 3♀ (AMNH\_PBI 00038830-AMNH\_PBI 00038832) (SAMA). **Western Australia:** 81 km E of Norseman, 32.07347°S 122.6166°E, 600 m, 23 Oct 1996, Schuh and Cassis, *Coopernookia strophiolata* (F.Muell.) Carolin (Goodeniaceae), det. PERTH staff PERTH 05054923, 10♂ (AMNH\_PBI 00016179 through AMNH\_PBI 00016188), 10♀ (AMNH\_PBI 00016189 through AMNH\_PBI 00016198) (AM), 113♂ (AMNH\_PBI 00003246 through AMNH\_PBI 00003260, AMNH\_PBI 00003292 through AMNH\_PBI 00003300, AMNH\_PBI 00003473 through AMNH\_PBI 00003561), 237♀ (AMNH\_PBI 00003261 through AMNH\_PBI 00003291, AMNH\_PBI 00003301 through AMNH\_PBI 00003327, AMNH\_PBI 00003562 through AMNH\_PBI 00003740) (AMNH), 18♂ (AMNH\_PBI 00003741 through AMNH\_PBI 00003758),

24♀ (AMNH\_PBI 00003759 through AMNH\_PBI 00003782) (UNSW), 9♂ (AMNH\_PBI 00030285 through AMNH\_PBI 00030293), 10♀ (AMNH\_PBI 00030294 through AMNH\_PBI 00030303) (WAMP).

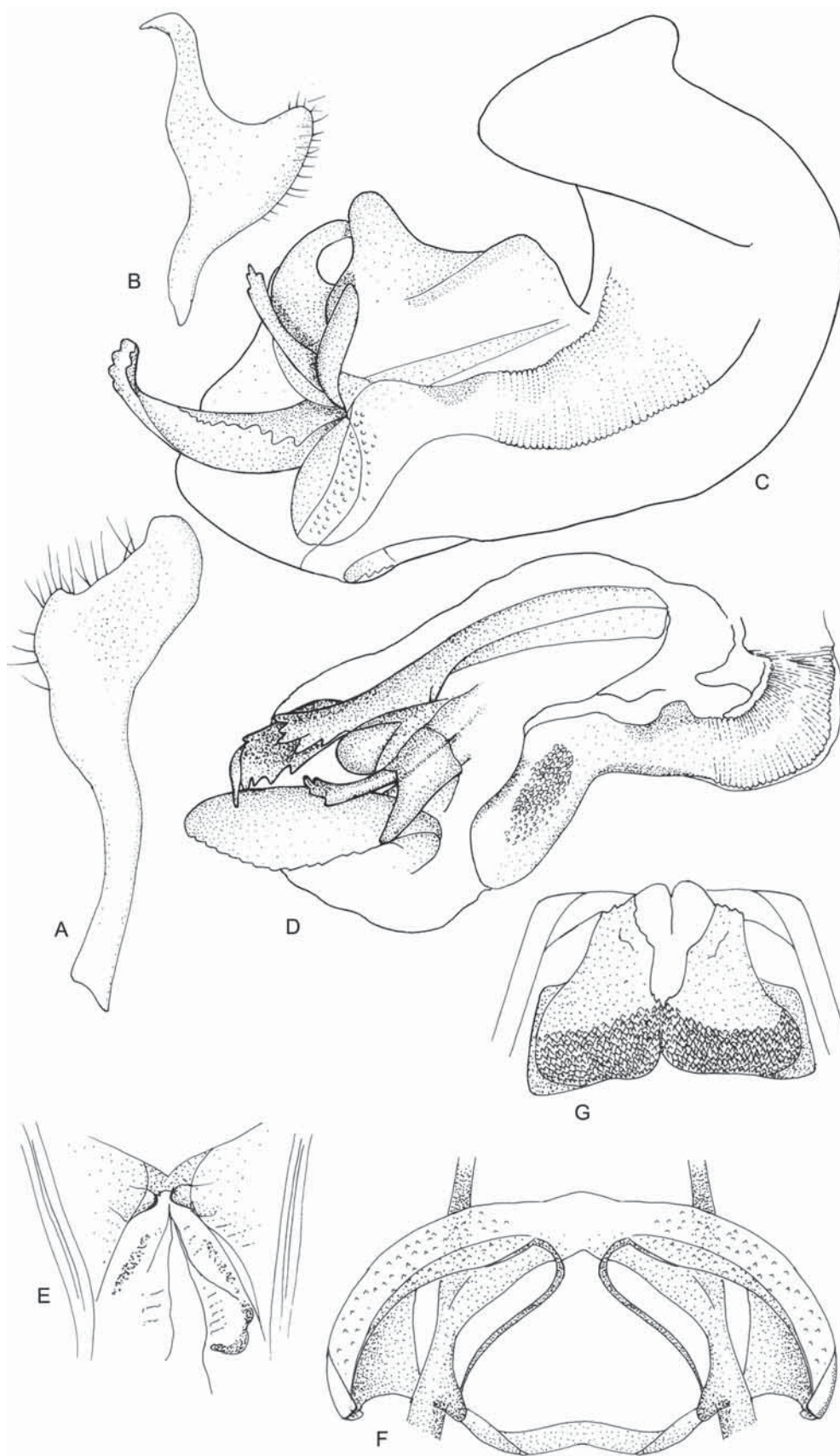


**FIGURE 5.** Comparison of the two *Goodeniaphila* spp. A) *G. cassisi*. B) *G. schuhi*.



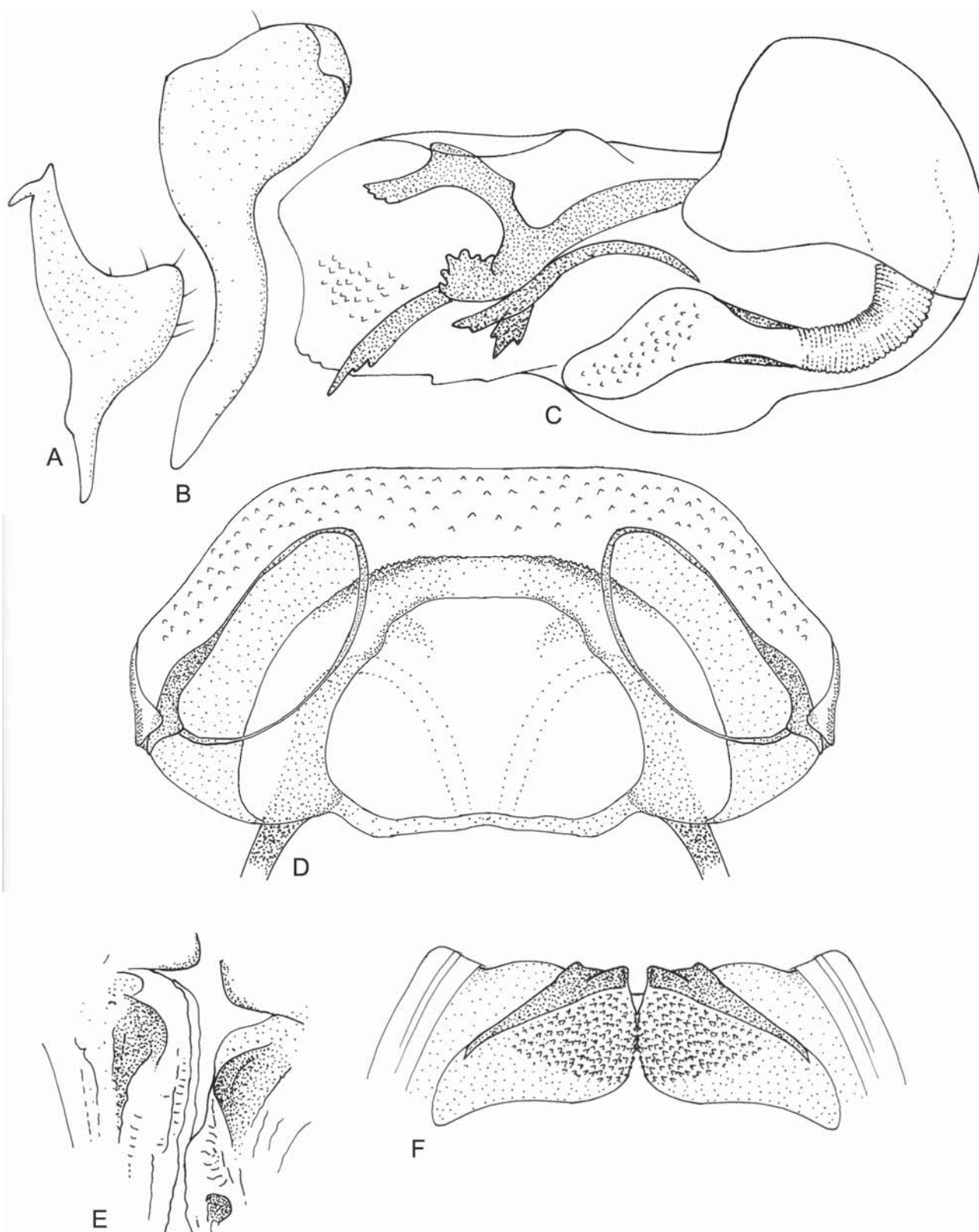


**FIGURE 6.** Scanning electron micrographs of male *Goodeniaphila cassisi*. A) Dorsum. B) Head, anterior view. C) Lateral view. D) Head and prothorax, lateral view. E) Meso- and metathorax, lateral view. F) Detail of metathoracic scent gland apparatus. G) Pygophore, posterior view. H) Pygophore, lateral view. I) Pygophore, ventral view. J) Tarsus.



**FIGURE 7.** *Goodeniaphila cassisi* genitalia. Male, A–D): A) Right paramere; B) left paramere; C) aedeagus; D) aedeagus, phallosome removed. Female, E–G): E) gonapophyses VIII; F) bursa copulatrix, dorsal view; G) posterior wall.





**FIGURE 8.** *Goodeniaphila schuhi* genitalia. A) Left paramere; B) right paramere; C) aedeagus; D) bursa copulatrix, dorsal view; E) gonapophyses VIII, ventral view; F) posterior wall.

***Goodeniaphila schuhi* sp. n.**

Figures 1, 4–5, 8

**Holotype:** AUSTRALIA: Northern Territory: ~ 75 km E of Stuart Highway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Scaevola basedowii* Carolin (Goodeniaceae), det. NSW staff NSW666255, 1♂ (AMNH\_PBI 00193246) (NTM).

**Diagnosis:** *Goodeniaphila schuhi* is slightly smaller than *G. cassisi*, and males are typically smaller than females. Distinguished from *G. cassisi* by the following combination of characters: mostly yellow legs, aedeagus with phallosome laterally compressed at apex, endosoma with unique spicule arrangement, female sclerotized rings widely separated.

**Description:** Body length 2.44–3.07 mm. COLORATION (Figs. 1, 5): Antennal segments I brown, II yellow to yellow-brown, apically embrowned, III and IV brown; hemelytra olive, rarely purple or black; legs yellow, sometimes with brown markings subapically on femora. SURFACE AND VESTITURE (Fig. 1): As in generic description. STRUCTURE: As in generic description. Male Genitalia (Fig. 8A–C): Apex of right paramere with short curved apical apophysis; apex of phallosome laterally compressed, with serrate field of spines; endosoma with several elongate, apically serrate, sometimes bifurcate spicules; remainder as per generic description. Female Genitalia (Fig. 8D–F): Sclerotized rings widely separated; posterior wall bilaterally divided, apically with paired sclerotized strips, posteromedially with fields of spines; remainder as per generic description.

**Distribution:** This species has been collected in both central Australia and the south-central coast.

**Etymology:** *G. schuhi* is named in honor of Randall Schuh, in recognition of his profound impact on heteropteran taxonomy and systematics.

**Paratypes:** AUSTRALIA: Northern Territory: jct of Namitjara Rd and Gosse Bluff track, 23.78335°S 132.359°E, 711 m, 04 Nov 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Scaevola ovalifolia* R.Br. (Goodeniaceae), det. NSW staff NSW666333, 9♂ (AMNH\_PBI 00003803 through AMNH\_PBI 00003811), 16♀ (AMNH\_PBI 00003812 through AMNH\_PBI 00003827), 1 juvenile (AMNH\_PBI 00003828) (AMNH), 3♂ (AMNH\_PBI 00003797 through AMNH\_PBI 00003799), 3♀ (AMNH\_PBI 00003800 through AMNH\_PBI 00003802) (UNSW). ~ 75 km E of Stuart Highway on Ernest Giles Road, 24.56668°S 132.5324°E, 511 m, 30 Oct 2001, Cassis, Schuh, Schwartz, Silveira, Wall, *Scaevola basedowii* Carolin (Goodeniaceae), det. NSW staff NSW666255, 13♂ (AMNH\_PBI 00003829 through AMNH\_PBI 00003841), 14♀ (AMNH\_PBI 00003842 through AMNH\_PBI 00003855) (AMNH), 9♂ (AMNH\_PBI 00193247 through AMNH\_PBI 00193255), 10♀ (AMNH\_PBI 00193256 through AMNH\_PBI 00193265) (NTM), 7♂ (AMNH\_PBI 00003783 through AMNH\_PBI 00003789), 7♀ (AMNH\_PBI 00003790 through AMNH\_PBI 00003796) (UNSW). **South Australia:** 1 km S by E Elliston, 33.4°S 134.54°E, 30 Nov 1992, I. D. Naumann & J. C. Cardale, 1♂ (AMNH\_PBI 00033751), 1♀ (AMNH\_PBI 00033752) (ANIC). 1 1/2 mi. S Hallett Cove, 35.08927°S 138.49777°E, 31 m, 15 Nov 1966 - 15 Nov 1966, H. M. Cooper, *Goodenia amplexans* (Goodeniaceae), 1♂ (AMNH\_PBI 00038824), 3♀ (AMNH\_PBI 00038825 through AMNH\_PBI 00038827) (SAMA). Brookfield Cons. Pk., 34.22°S 139.27°E, 26 Nov 1992 - 26 Nov 1992, I. D. Naumann & J. C. Cardale, 1♂ (AMNH\_PBI 00033750) (ANIC).

## Discussion

On the basis of the lamellate, apically convergent parempodia, and lack of phyline-type genitalia (S-shaped, vesica, phallosome directly attached to the pygophore), both *Dampierella* and *Goodeniaphila* are identified as belonging to the subfamily Orthotylinae. The assignment of both genera to the tribe Halticini can be made primarily on the basis of the male and female genitalia. Consistent with other halticines (see Kelton, 1959; Kerzhner & Konstantinov, 1999) is the presence in both genera of a well-developed endosoma, in which one to several spicules are attached distal to the secondary gonopore. By and large, the parameres of both genera



are also of the halticine-type (i.e., right paramere elongate and spoon-shaped, left paramere with angular hypophysis). The base of each paramere in the Halticini is typically elongate (Schwartz and Tataric 2008); however, in both *Dampierella* and *Goodeniaphila* only the base of the right paramere is elongate. Although atypical for the tribe, this condition is nonetheless seen in other Halticini (e.g., *Coridromius*, *Dimorphocoris*, *Plagiotylus*) and does not warrant exclusion of these genera from the Halticini.

The female genitalia of these genera are also consistent with other Halticini: the slightly upturned lateral margins of the sclerotized rings along with the adjacent portion of the dorsal labiate plate, and the lack of inter-ramal lobes on the posterior wall are typical of the tribe (Slater 1950). Of note in both genera is the mostly symmetrical sclerotization of gonapophyses VIII. Schuh and Lattin (1980) were the first to note such symmetrical sclerotization of the vestibular region in the halticine species *Myrmecophyes oregonensis* – a condition atypical for either the Orthotylinae or the Phylinae. More recently Pluot-Sigwalt and Matocq (2006), observed the same condition in several halticines (*Dimorphocoris* sp., *Halticus luteicollis*, *Pachytomella parallela*), providing evidence that this may be diagnostic for the Halticini (Schwartz et al. 2008). The evidence presented here is consistent with this view, though a more thorough survey of the halticines is warranted. *Goodeniaphila* is notable in that the sclerotization of gonapophyses VIII is nearly symmetrical but for the presence of a small accessory sclerite on the left margin. This accessory sclerite is not known in the other halticines noted above; however, it is present in some Orthotylini, albeit in a much more pronounced form (M.D. Schwartz, pers. comm.). The taxonomic significance of this trait cannot be ascertained without detailed phylogenetic analysis of the subfamily.

Little is known of the biology of the new taxa described in this work. However, it is worth noting that *Goodeniaphila cassisi* sp. n. was found in great numbers at the type locality, on *Cooperhooikia stropholata*, which was also abundant in a roadside ditch that had recently been impacted by wildfire. The plants were found in association with coppiced eucalypts, where a large series of an unidentified species of the monaloniine genus *Eucercoris* (Miridae: Bryocorinae) was also found. As a consequence, it is possible to hypothesize that both these species of plant bugs were colonists at a local scale (Cassis pers. comm.).

The most interesting conclusion that can be drawn about these three new species of halticines is their exclusive association with plants belonging to the Goodeniaceae. This is the first record of true bugs on the Goodeniaceae in Australia (see Cassis and Gross 2002, for true bug host plant records), and demonstrates phylogenetic restrictedness towards this plant family in terms of food preferences. Belonging to the plant order Asterales, the Goodeniaceae are mostly Australian (ca. 400 species), although the genus *Scaveola* is pantropical (Watson and Dallwitz 2008). Cassis and Vanags (2006) and Cassis et al. (2007) have highlighted that host specialization of Australian true bugs on asterid angiosperms is less common than on rosid angiosperms. However, asterid specialization may be more common than initially thought, as demonstrated by the recent documentation by Cassis and Symonds (2008) of species of the lacebug genus *Inoma* that live on asterids.

It should be noted that although *Dampierella* and *Goodeniaphila* were both found exclusively on Goodeniaceae, they do not appear to be sister genera. *Dampierella* seems most similar to *Halticus*, while *Goodeniaphila* is perhaps more closely related to *Strongylocoris* or may even be basal in the Halticini, given the unique Orthotylini-like vestibular structure discussed above. Until a comprehensive phylogenetic analysis of the Halticini is conducted, the true phylogenetic position of these genera remains unknown.

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